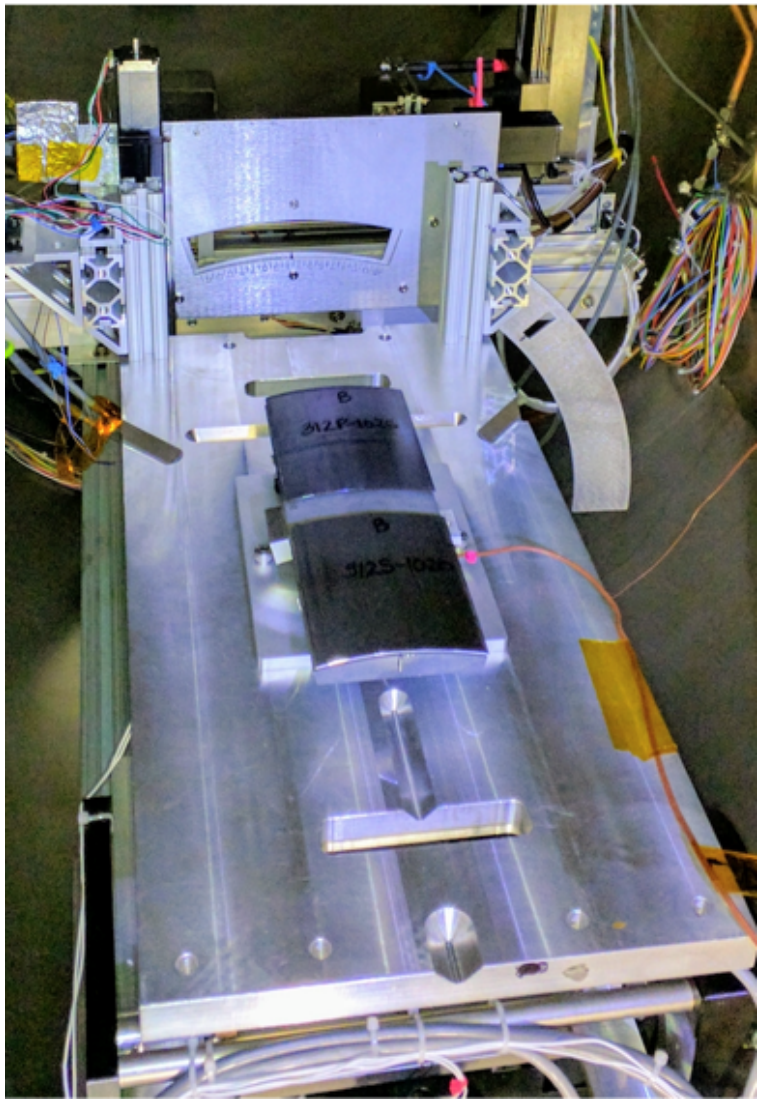
2021 Hardware Images

PCOS and COR Strategic Technology Portfolio

For more information about these technologies visit our Technology Database (http://www.astrostrategictech.us)

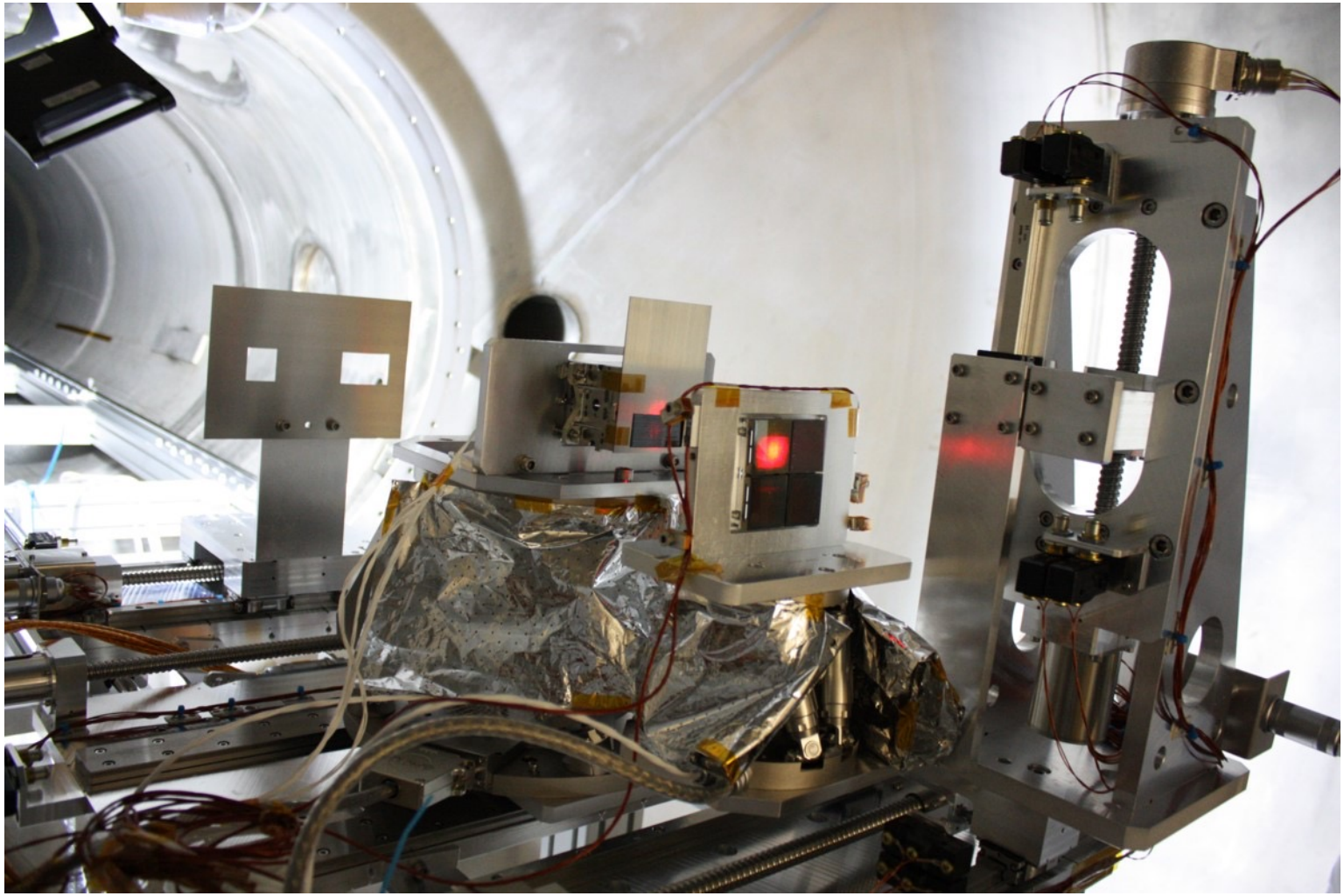


Thin grazing-angle X-Ray Mirrors Ready for X-Ray Testing

Significance: World-class thin grazing-angle X-ray mirror technology that may enable the next X-ray Great Observatory

Project Title: Next Generation X-ray Optics: High Resolution, Light Weight, and Low Cost

PI: Zhang, William (GSFC)

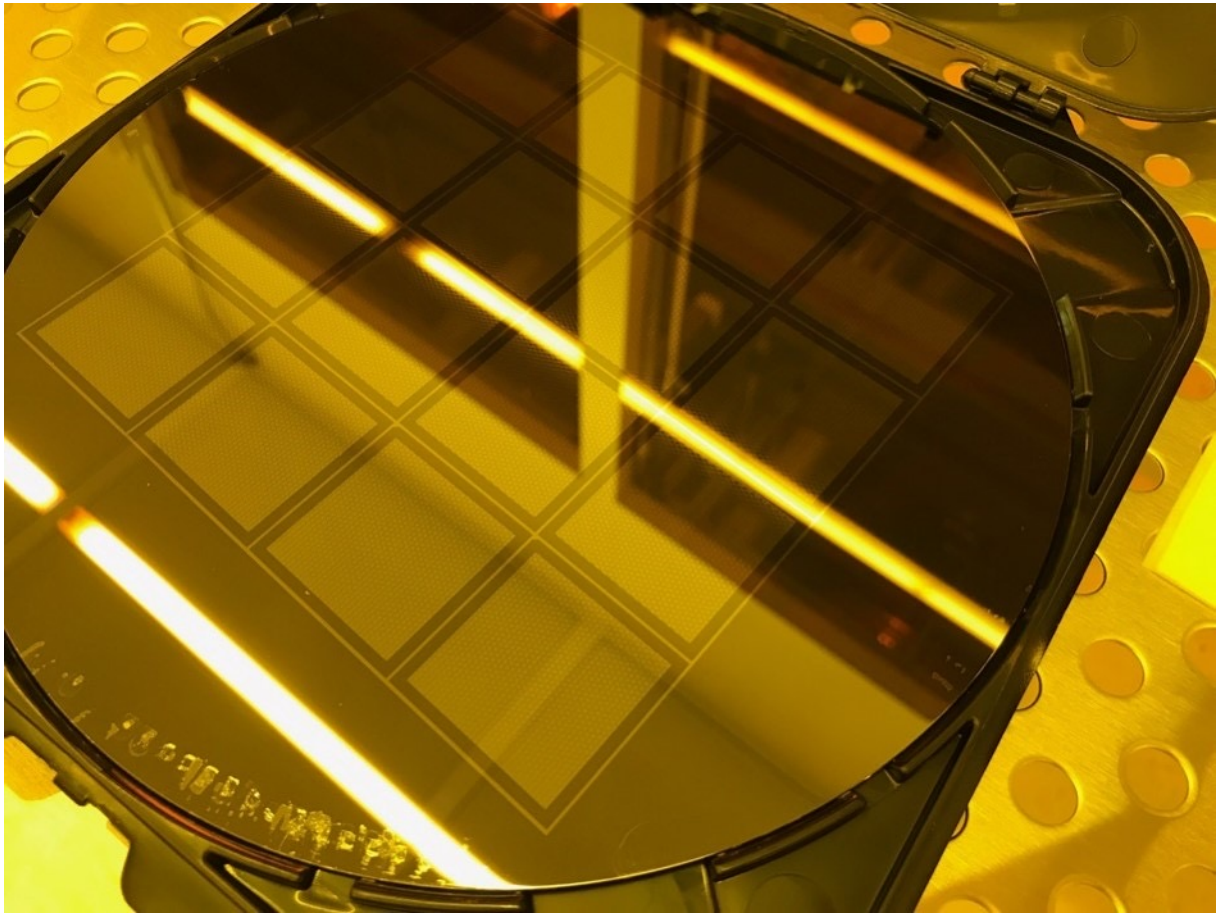


Critical-Angle Transmission (CAT) gratings at PANTER X-Ray Beam

Significance: Highest-resolution X-ray transmission grating technology that could fly on the next X-ray Great Observatory

Project Title: High Resolution and High Efficiency X-ray Transmission Grating Spectrometer

PI: Mark Schattenburg (MIT Kavli Institute for Astrophysics and Space Research)



200-mm wafer patterned with 16 ARCUS-style Critical-Angle Transmission (CAT) gratings

Significance: Enhances manufacturability of highest-resolution X-ray transmission grating technology that could fly on the next X-ray Great Observatory

Project Title: Readying X-ray Gratings and Optics for Space Applications: Manufacturability and Alignment

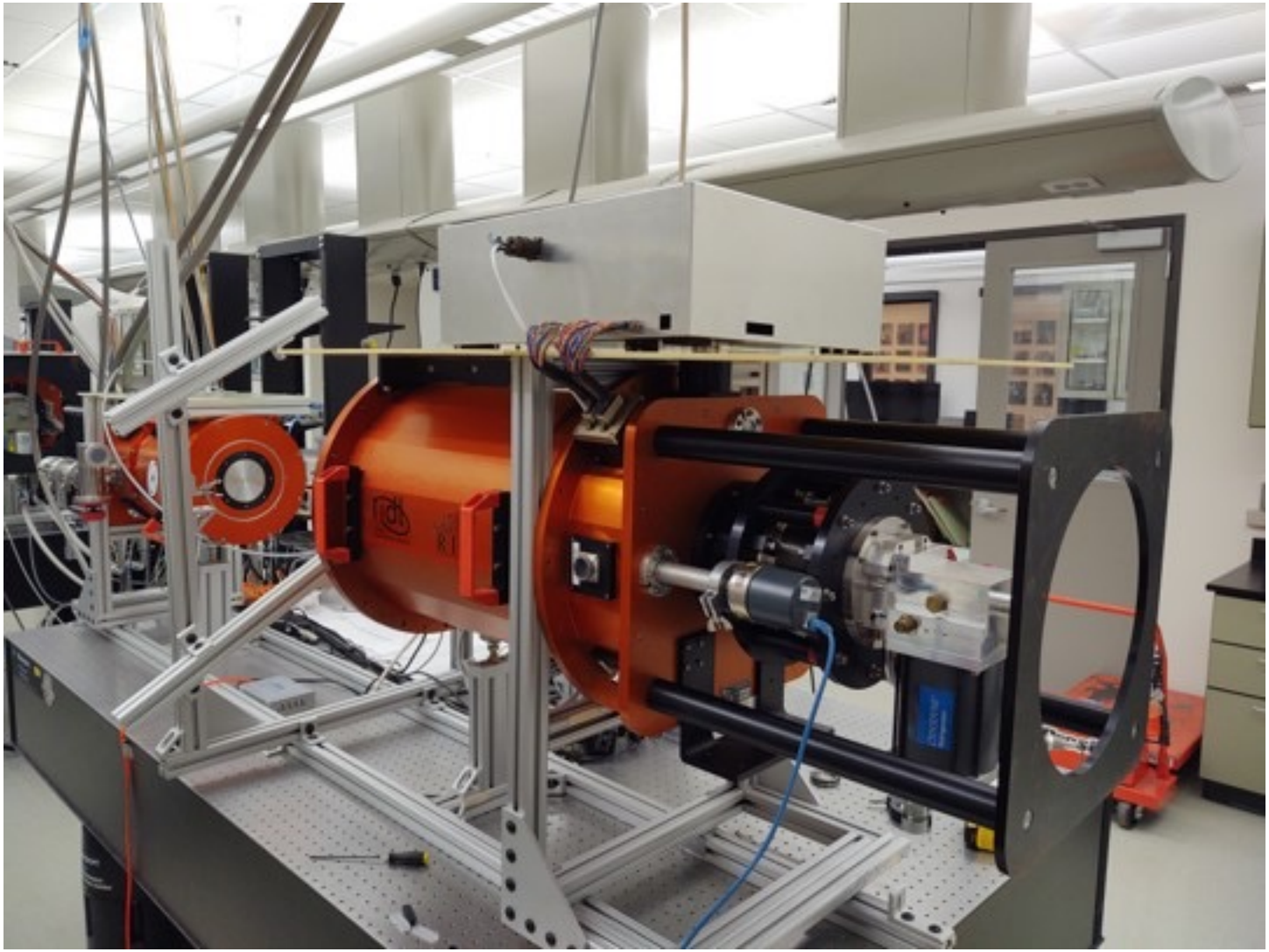
PI: Randall Smith (SAO)

RFSoC Enclosure for Balloon Missions, with Thermal Management

Significance: Fast readouts are crucial for large focal plane arrays in future missions

Project Title: Development of Low-Power FPGA-based Readout Electronics for Superconducting Detector Arrays

PI: Philip Mauskopf (ASU)

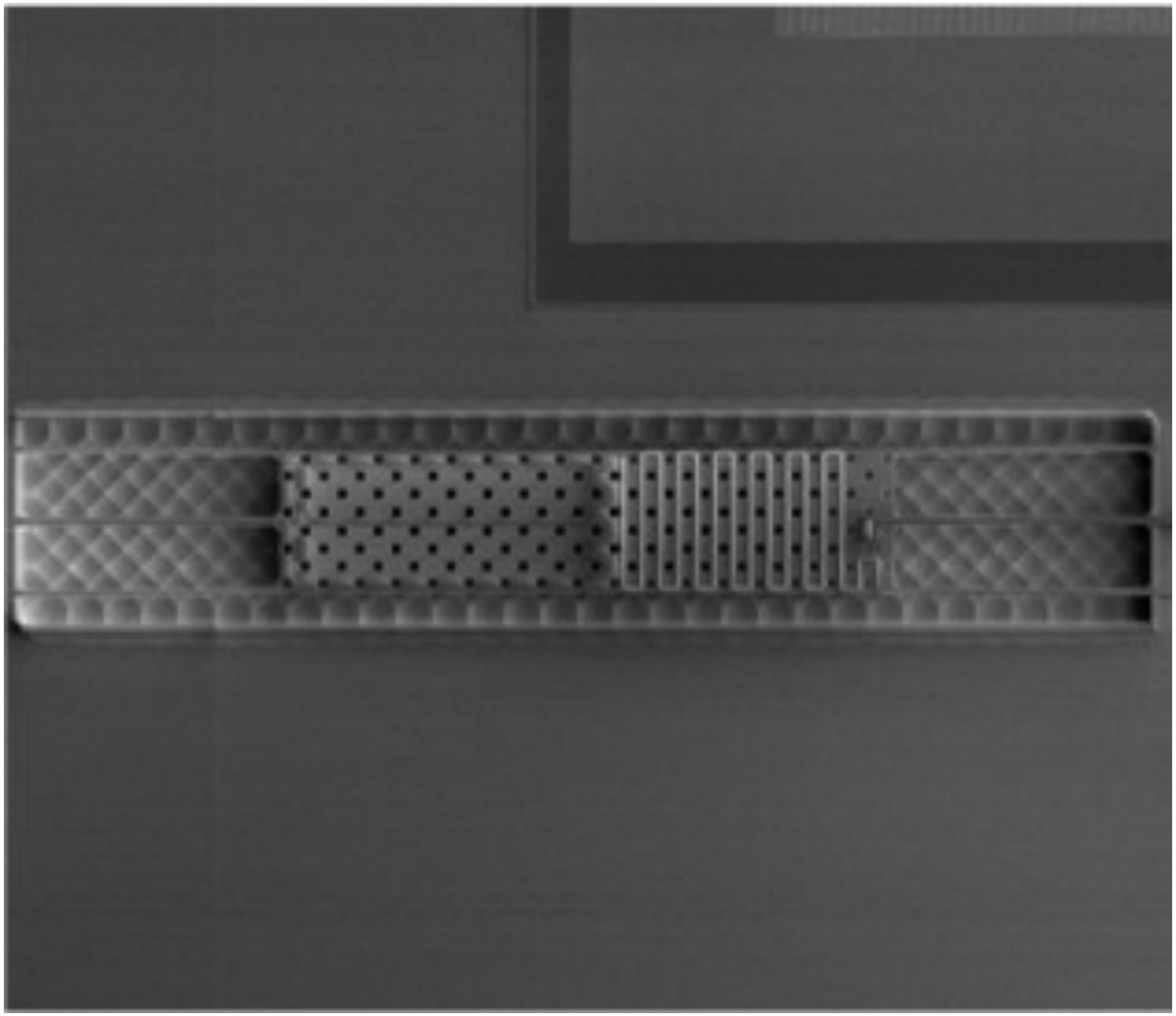


Dewar with Assembled Electronics

Significance: Low-noise detectors are crucial for future missions

Project Title: A Single-Photon-Sensing and Photon-Number-Resolving Detector for NASA Missions

PI: Don Figer (RIT)

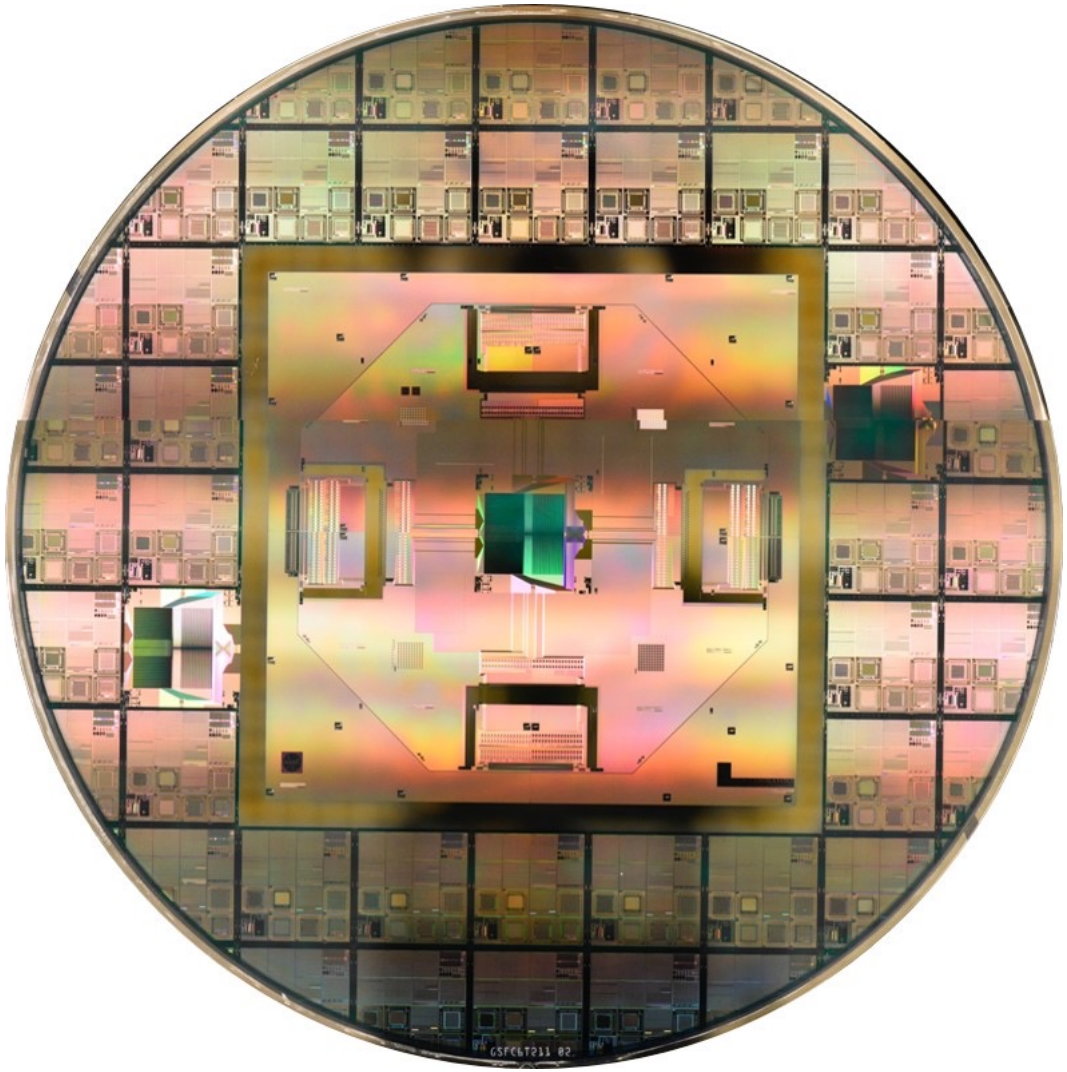


Scanning Electron Microscope (SEM) Image of Part of a Thermal Kinetic Inductance Detector (TKID)

Significance: CMB polarimetry is crucial for identifying echoes of the Big Bang

Project Title: Superconducting Detectors for Cosmic Microwave Background (CMB) Polarimetry in PICO

PI: Roger O'Brient (JPL/Caltech)

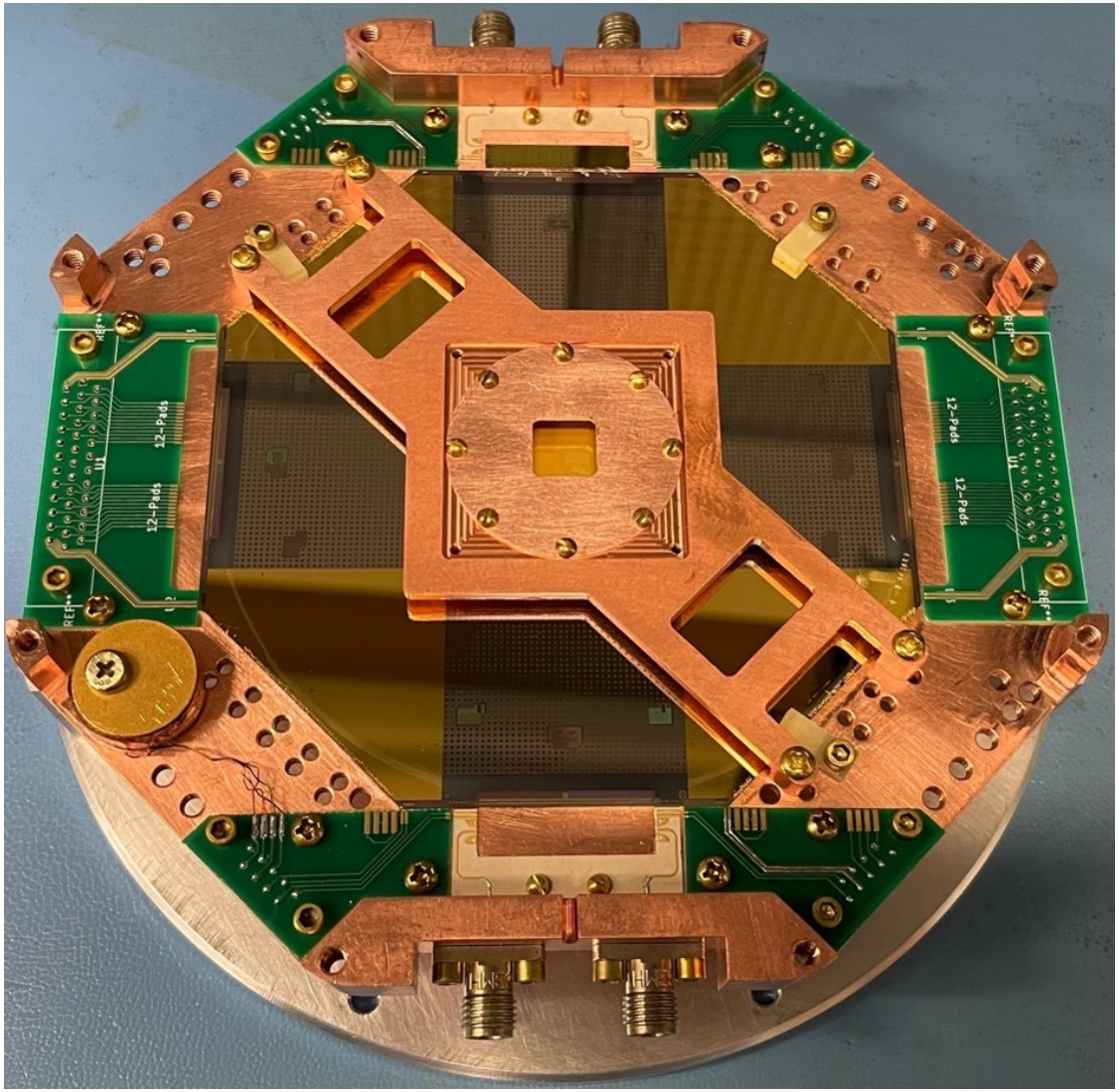


Lynx-Style Transition-Edge-Sensor (TES) X-Ray Detector Array on Wafer

Significance: High-resolution TES microcalorimeters may enable the next X-ray Great Observatory

Project Title: Advanced X-ray Microcalorimeters: TES Microcalorimeters

PI: Caroline Kilbourne (GSFC)

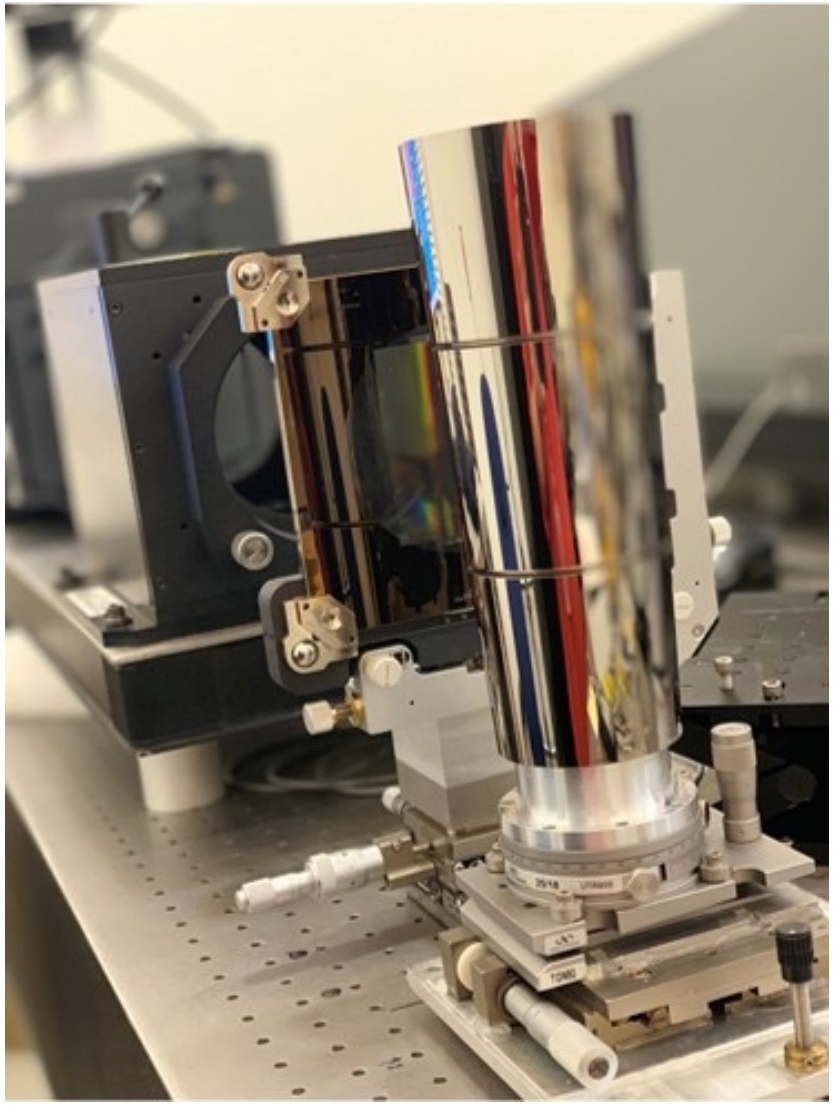


GSFC Package for Lynx-Style LXM Large-Format Arrays

Significance: MMCs offer energy resolution that may enable the next X-ray Great Observatory

Project Title: MMC Arrays for X-ray Astrophysics

PI: Simon Bandler (GSFC)

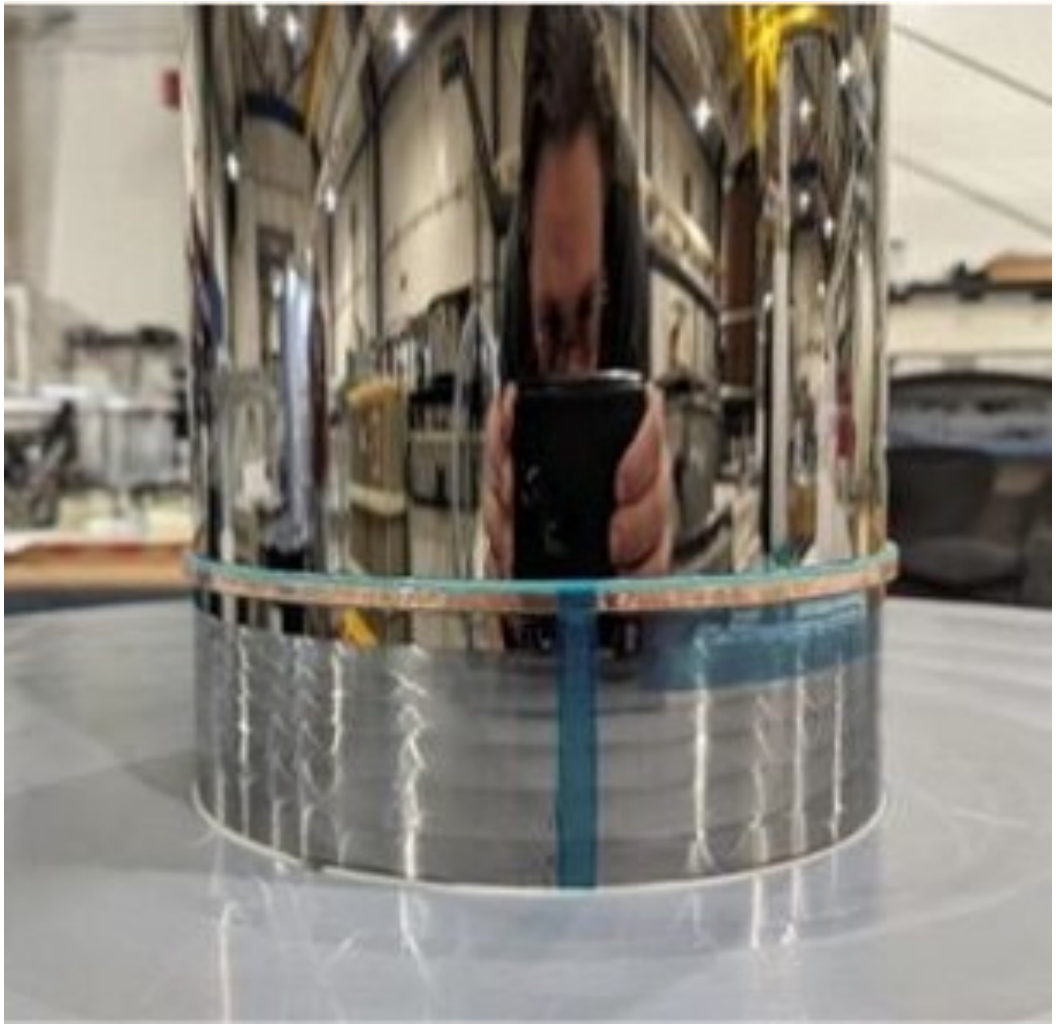


High-Precision Mandrel Polishing

Significance: High-quality X-ray optics may enable or enhance future Astrophysics missions

Project Title: Advanced X-ray Optics: Computer-Controlled Polishing of High-Quality Mandrels

PI: Jacqueline Davis (MSFC)



Mandrel with Optimized Gasket

Significance: High-quality X-ray optics may enable or enhance future Astrophysics missions

Project Title: Advanced X-ray Optics: Mirror Fabrication – Replication Studies and Direct Polishing

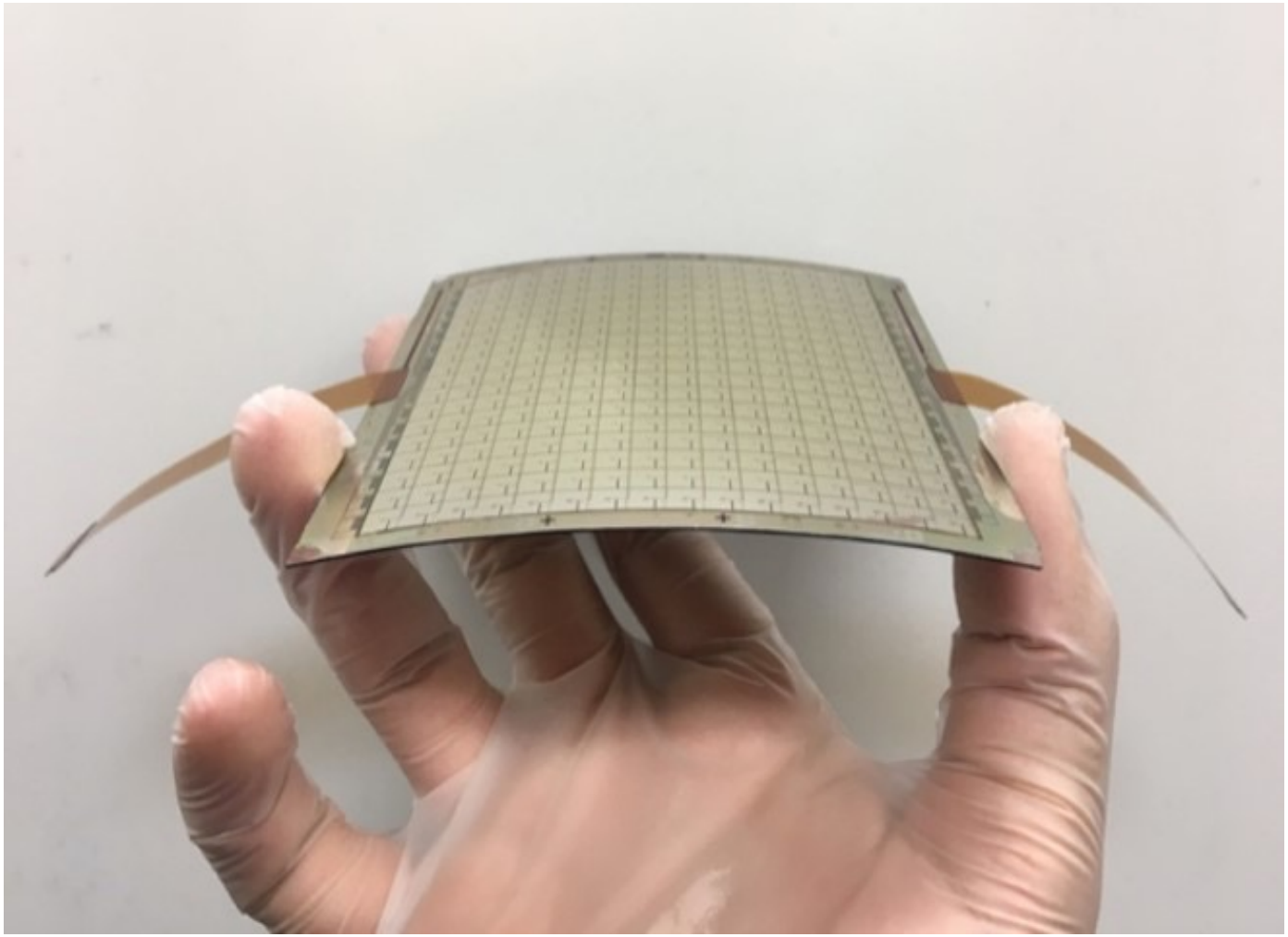
PI: Stephen Bongiorno (MSFC)

Custom Stress Sensor

Significance: High-quality EUV and X-ray optics may enable or enhance future Astrophysics missions

Project Title: Advanced X-ray Optics: Mirror Coatings

PI: David Broadway (MSFC)



Adjustable Thin X-ray Mirror

Significance: Adjustable X-ray optics were a backup technology for the Lynx X-ray large mission concept

Project Title: Adjustable X-Ray Optics

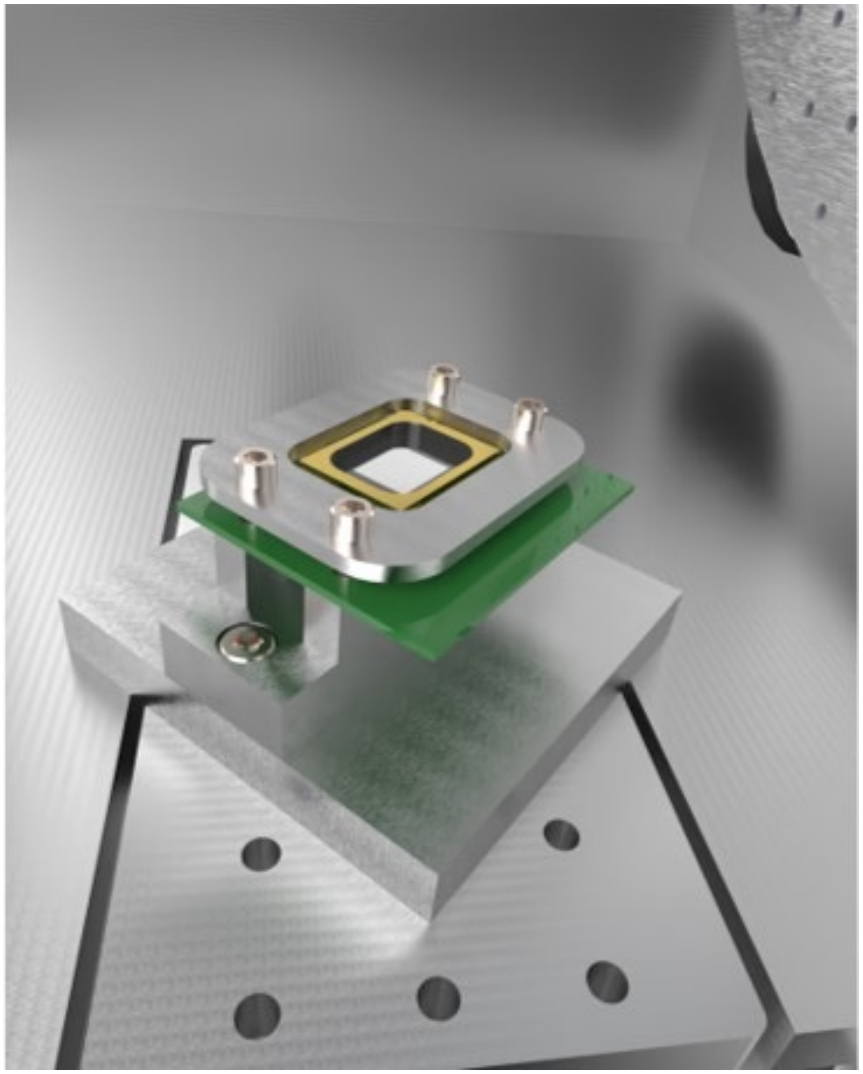
PI: Paul Reid (SAO)

X-Ray CCD Packaging with Shielding

Significance: Advanced X-ray detectors may enable the next X-ray Great Observatory

Project Title: Toward Fast, Low-Noise, Radiation Tolerant X-ray Imaging Arrays for Lynx: Raising Technology Readiness Further

PI: Mark Bautz (MIT Kavli Institute for Astrophysics and Space Research)

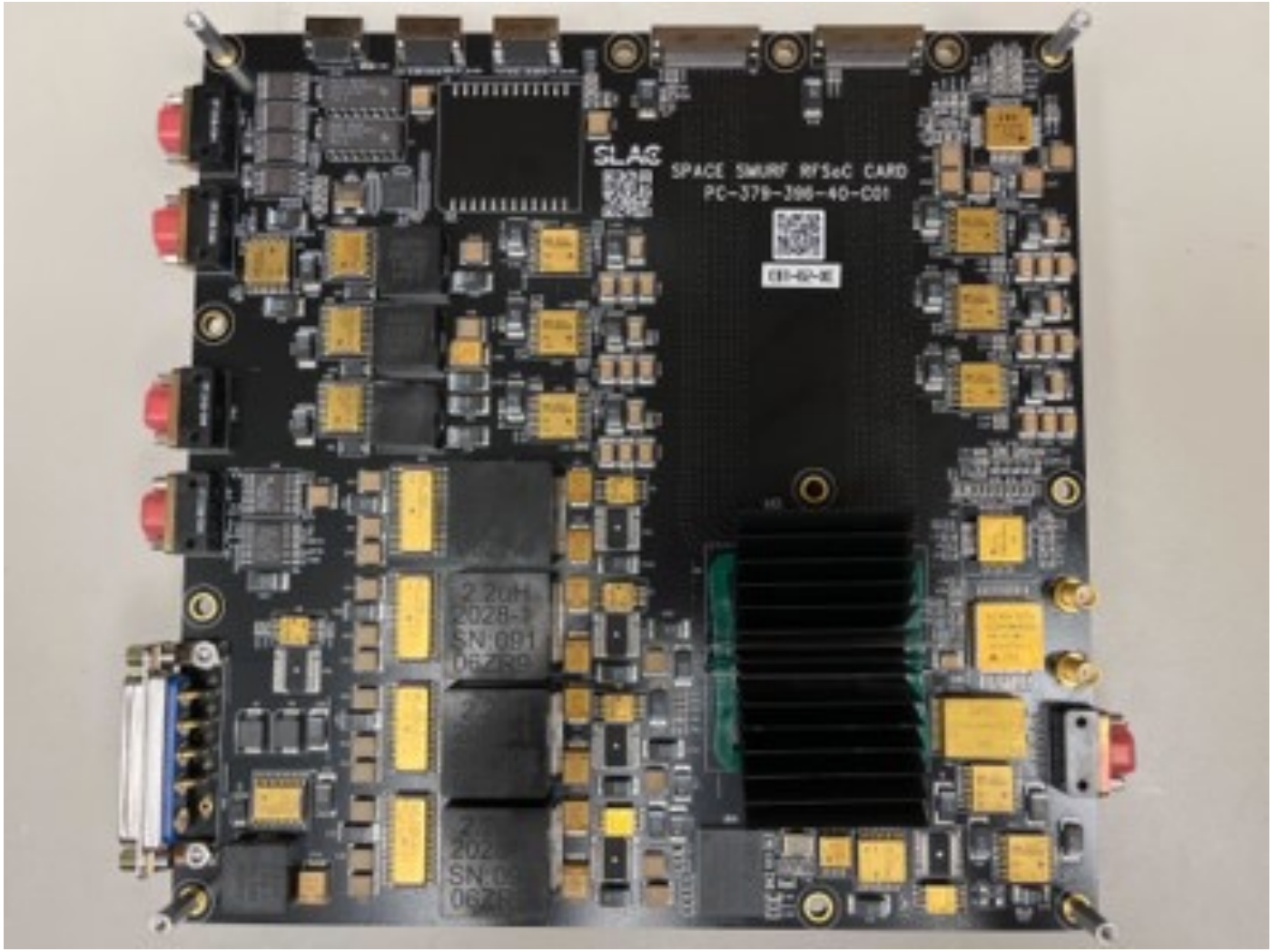


Digital Micromirror Device (DMDs) with Daughterboard

Significance: Replacing windows of commercial DMDs may enable far-UV multi-object spectrometry in future missions

Project Title: Development of DMDs for Far-UV Applications

PI: Zoran Ninkov (RIT)



Radio Frequency System-on-Chip (RFSoC) Brassboard Readout

Significance: High-density readout may enable large focal planes needed for future missions

Project Title: Advancing High-Density Readout Technology for Superconducting Sensor Arrays for Spaceflight

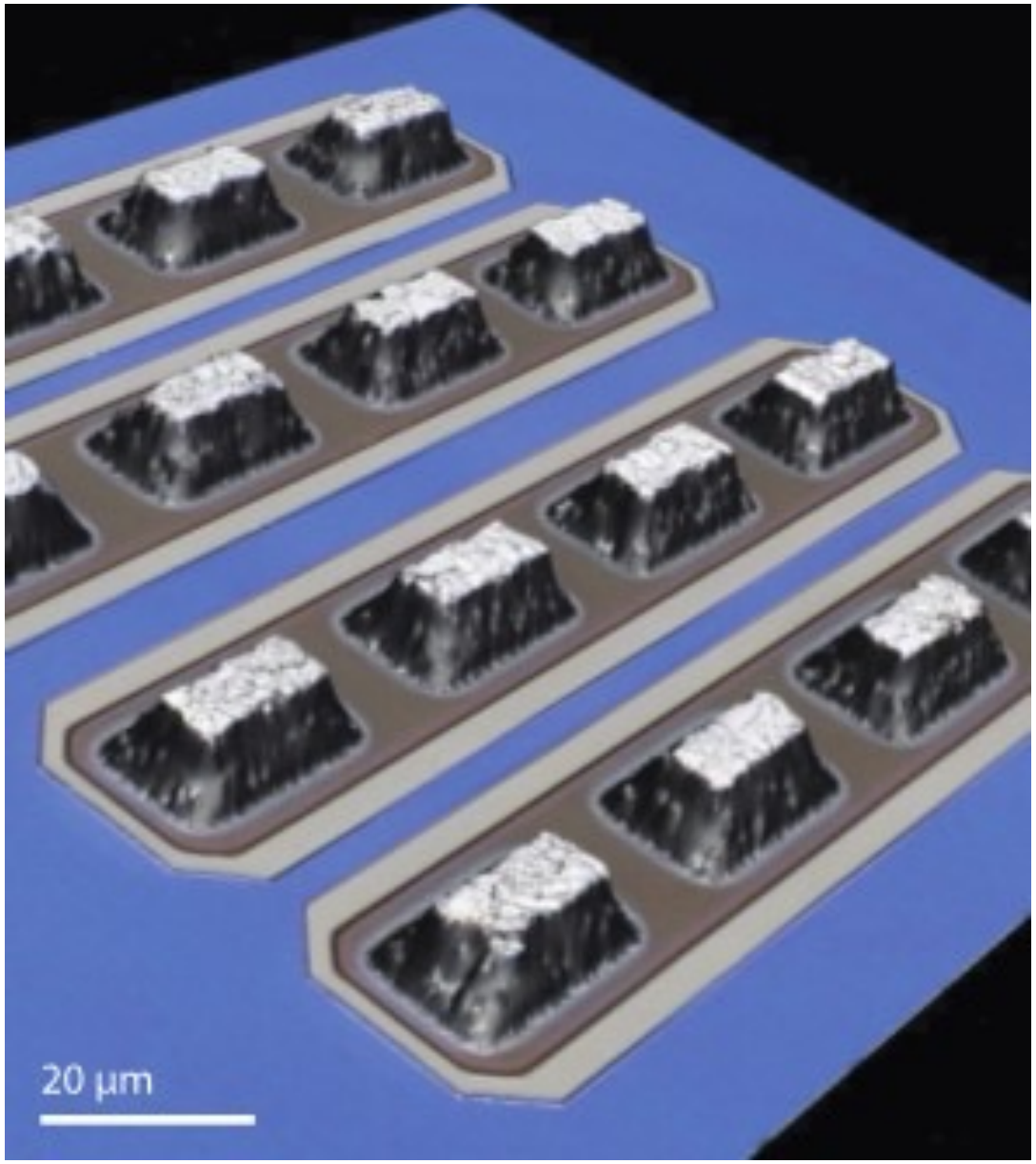
PI: Josef Frisch (SLAC)

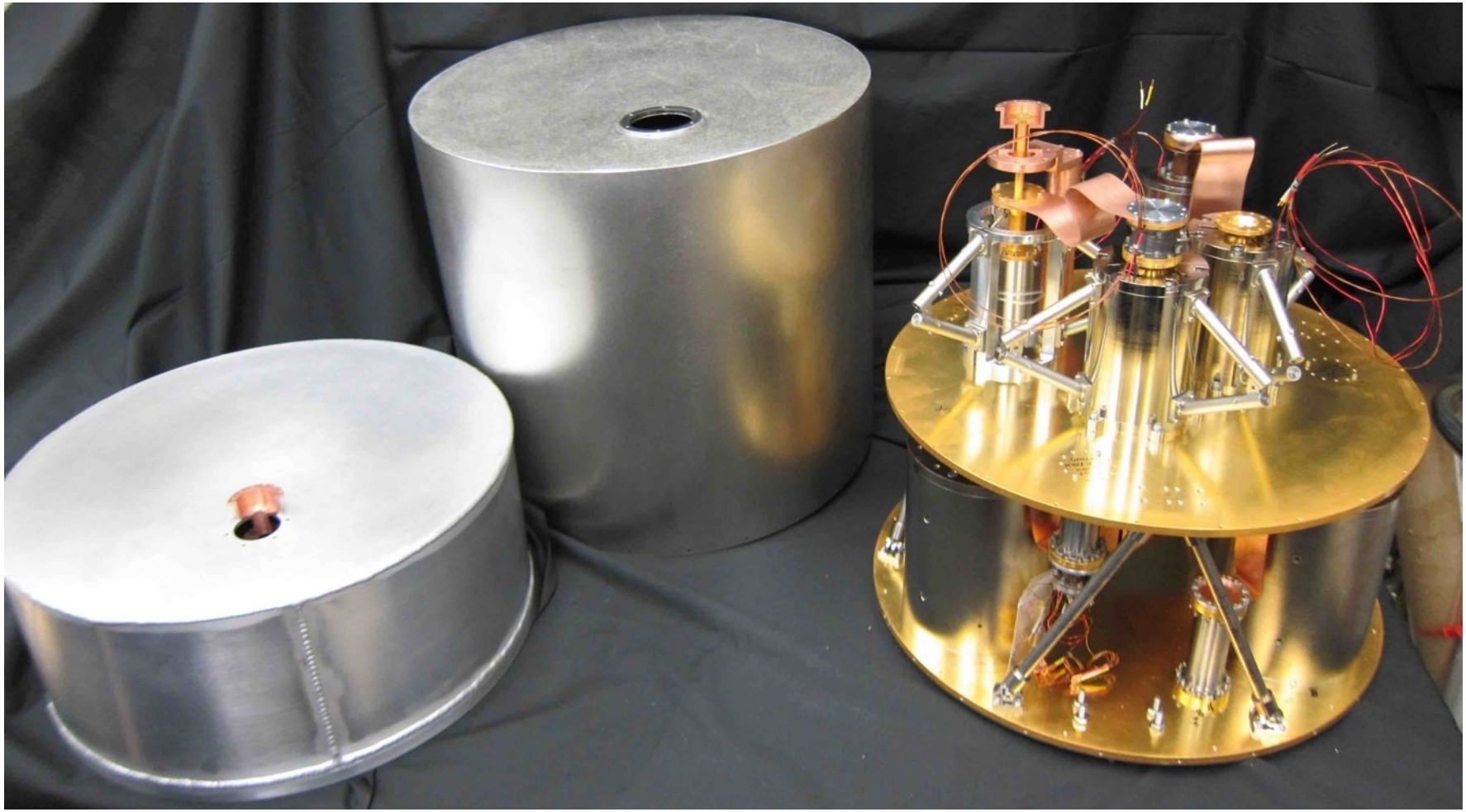
Microscopic Image of Indium Bump Field for Use with Transition-Edge Sensors (TESs)

Significance: High-multiplexing-factor readouts may enable missions such as the next X-ray Great Observatory

Project Title: Technology development for Microwave Superconducting QUantum Interference Device (SQUID) multiplexing for the Lynx X-ray Observatory

PI: Douglas Bennett (NIST)



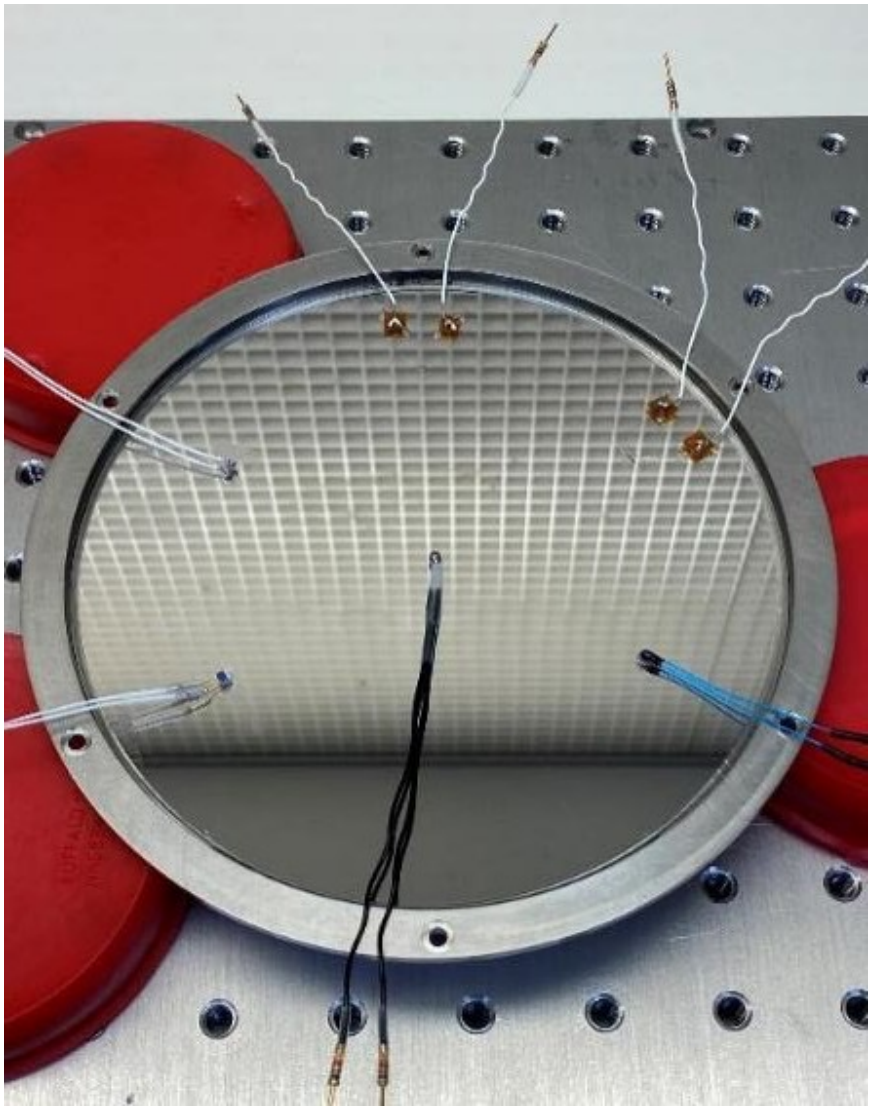


Assembly Fit-Check of a 6-Stage Continuous Adiabatic Demagnetization Refrigerator (CADR)

Significance: This advanced sub-Kelvin cooling technology may enable multiple future strategic missions

Project Title: High-Efficiency Continuous Cooling for Cryogenic Instruments and sub-Kelvin Detectors

PI: James Tuttle (GSFC)

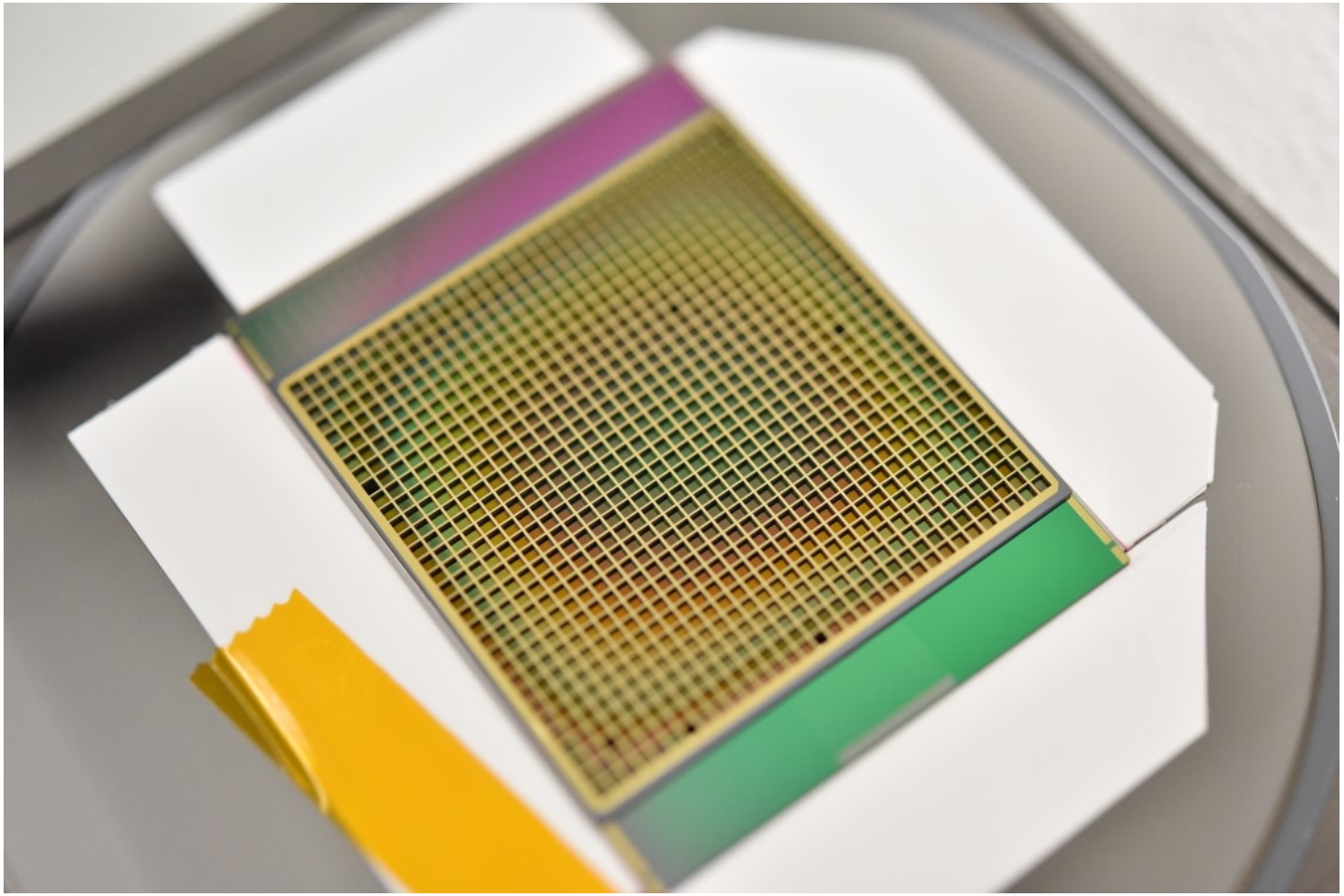


ULE® Mirror Substrate with Thermal Sensors

Significance: Ultra-stability and -precision (~10 pm) may enable the next IR/optical/UV Great Observatory

Project Title: Ultra-Stable Structures

PI: Babak Saif (GSFC)

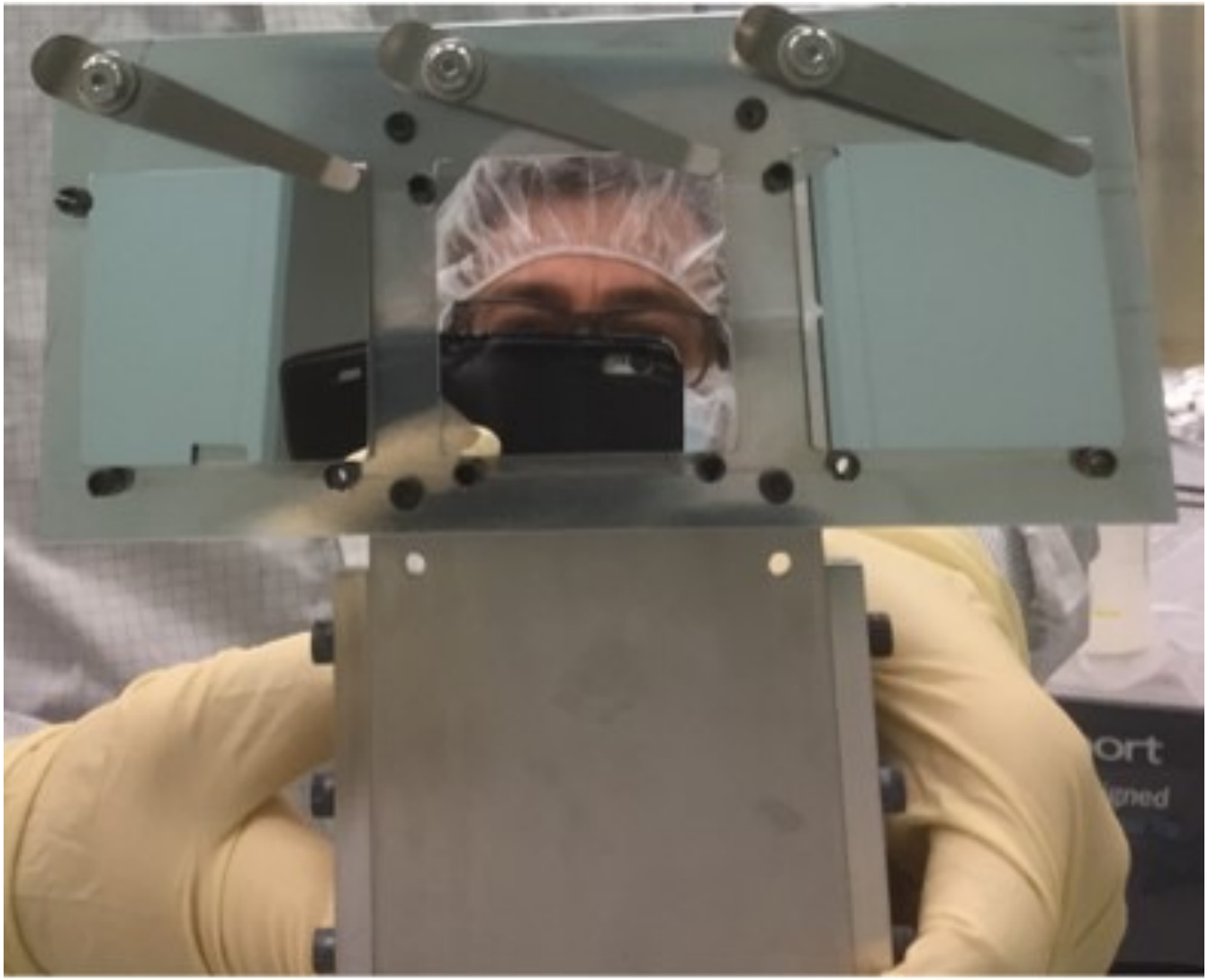


Hybridized Far-IR Detector

Significance: Advanced far-IR detectors may enable the next Far-IR Great Observatory

Project Title: Development of a Robust, Efficient Process to Produce Scalable, Superconducting Kilopixel Far-IR Detector Arrays

PI: Johannes Staguhn (JHU & GSFC)

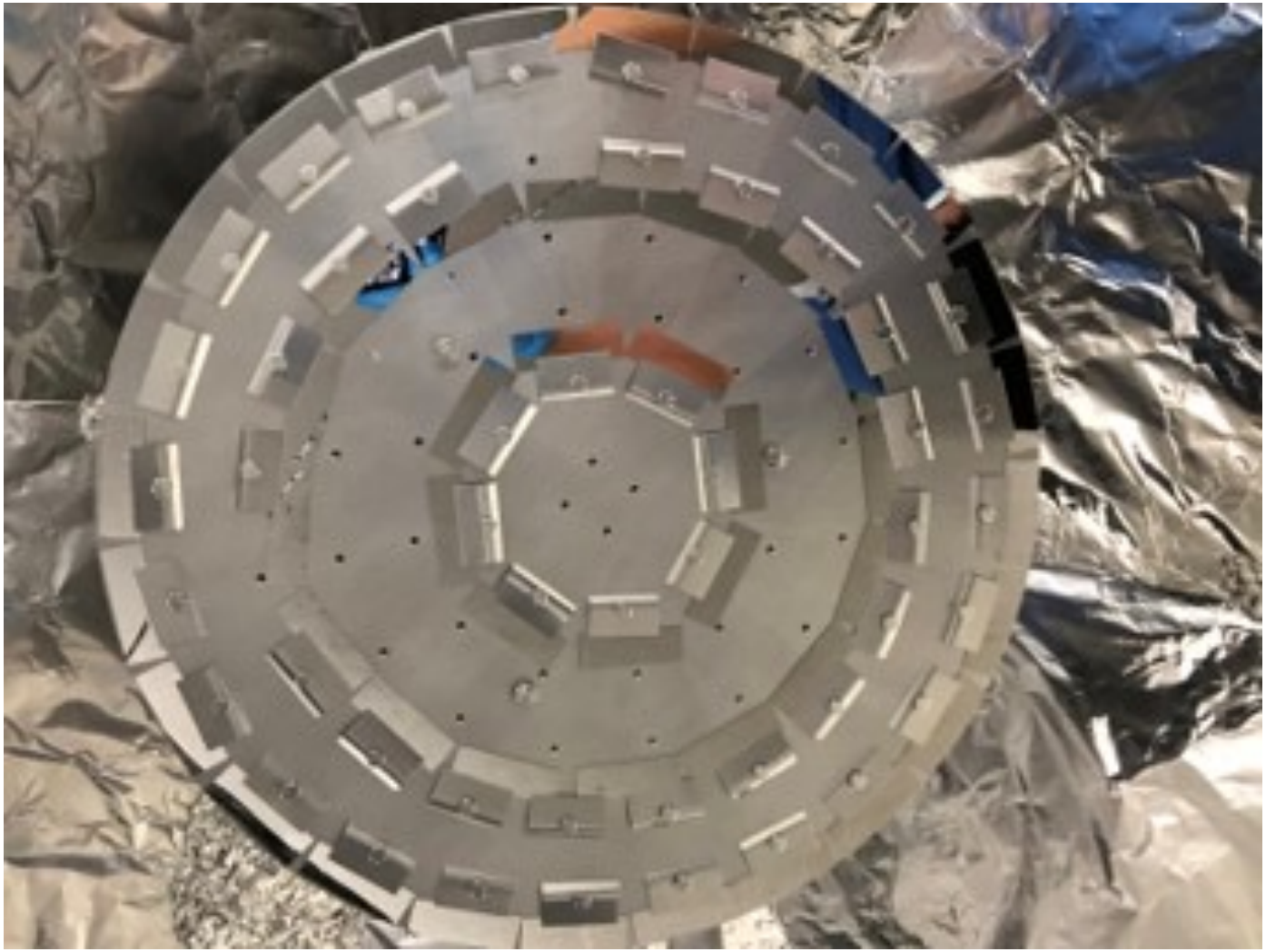


Measuring Lyman-UV Reflectance of Al+LiF Capped by AlF_3 and MgF_2

Significance: Advanced coatings may enable future far-UV missions

Project Title: High-Performance, Stable, and Scalable UV Aluminum Mirror Coatings Using ALD

PI: John Hennessy (JPL)

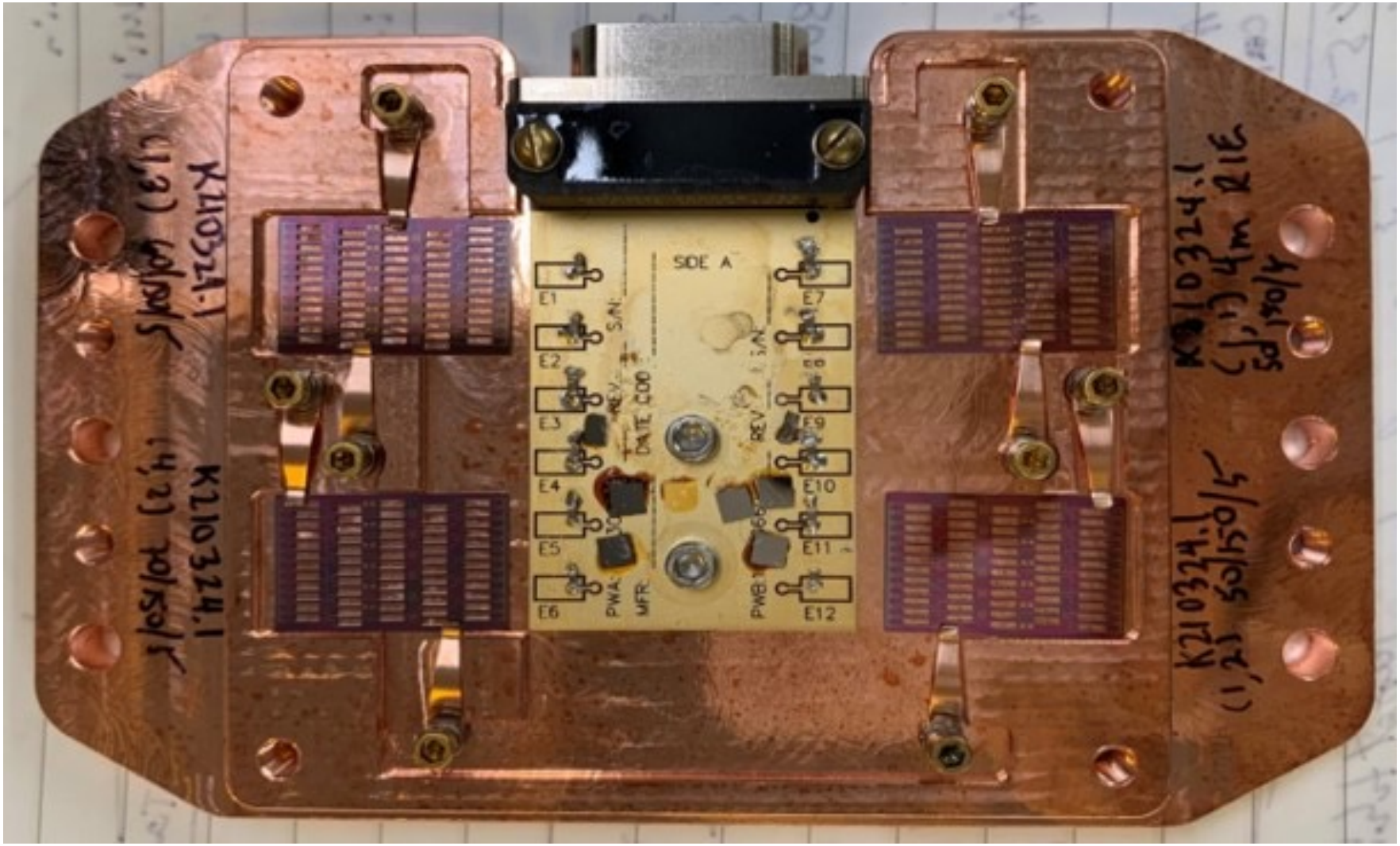


600-mm Dummy Primary Mirror with Coated Mirror Coupons

Significance: High far-UV reflectance is prevented by oxidation of aluminum mirrors; removing it may enable future far-UV missions

Project Title: E-Beam-Generated Plasma Etching for Developing High-Reflectance Mirrors for Far-Ultraviolet Astronomical Instrument Applications

PI: Manuel Quijada (GSFC)

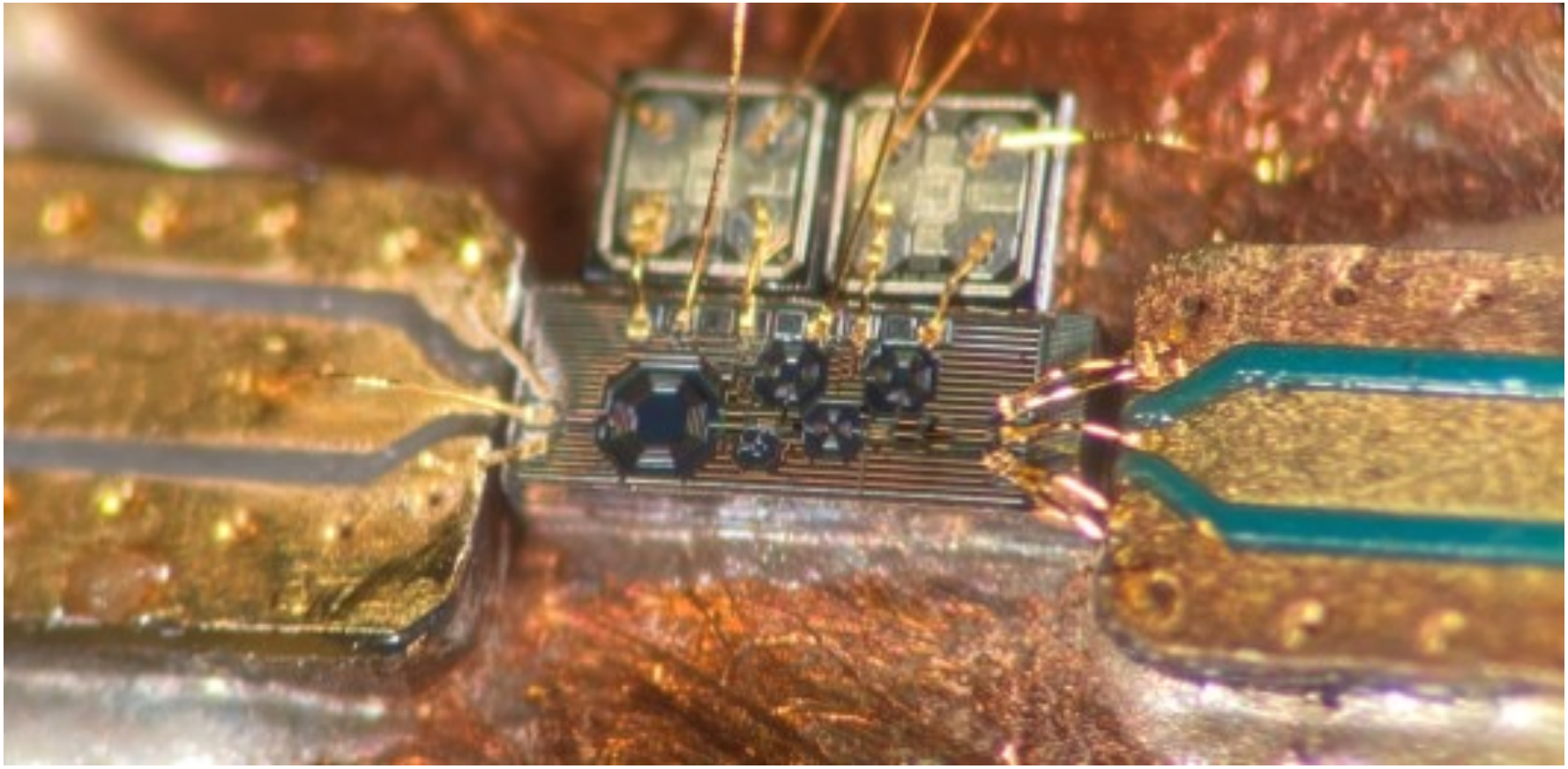


Ti-Au Thermistor

Significance: Extremely sensitive far-IR detectors may enable future missions

Project Title: Ultra-Sensitive Bolometers for Far-IR Space Spectroscopy at the Background Limit

PI: C. Matt Bradford (JPL)

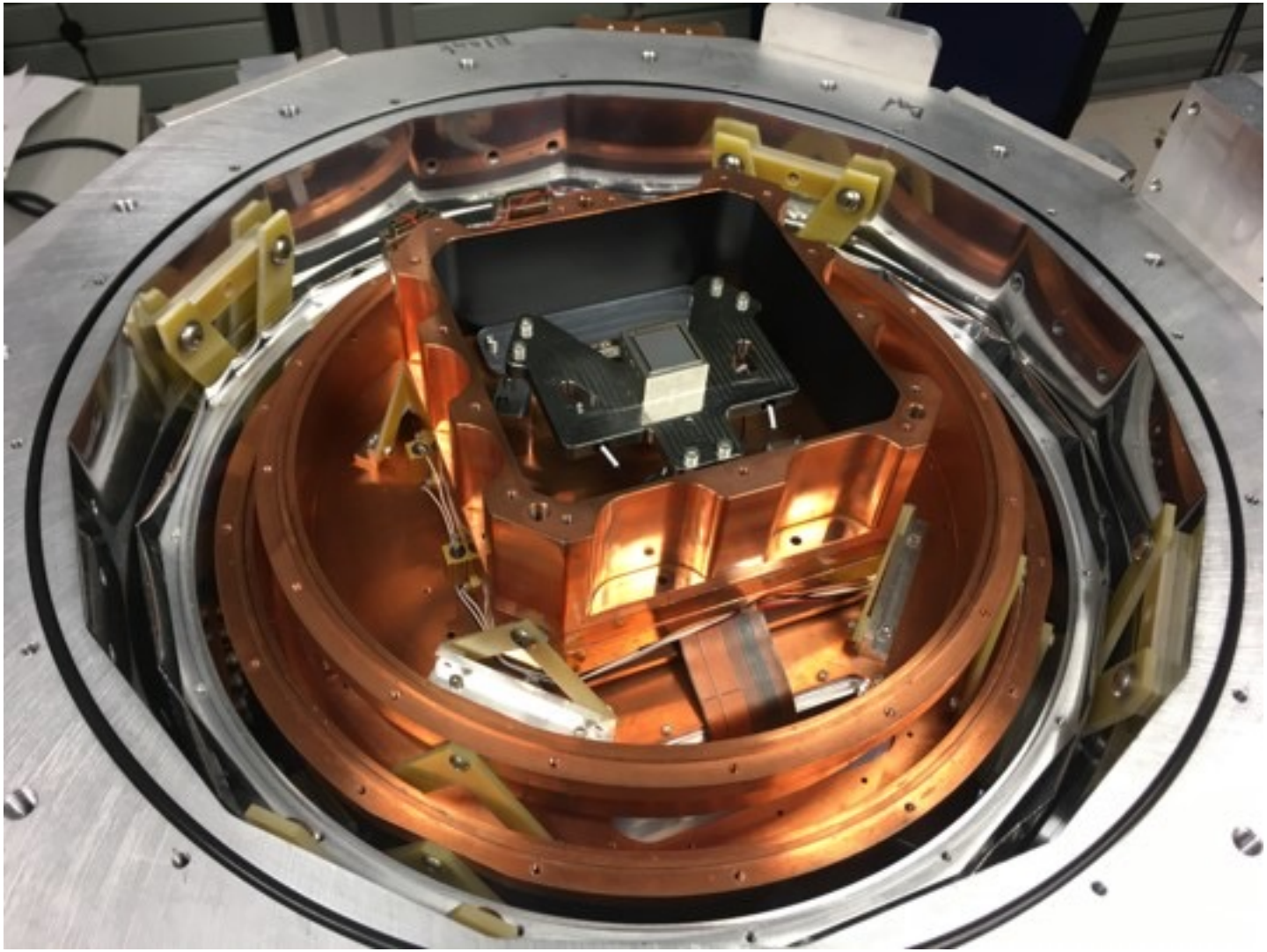


RF Amplifier Detail

Significance: Further development of this high-resolution far-IR detector technology to higher pixel numbers may enable or enhance future missions

Project Title: Development of High-Resolution Far-IR Arrays

PI: Imran Mehdi (JPL)



Readout Integrated Circuit Chip Mounted in Ultra-Low-Background Camera ULBCam

Significance: Ultra-low-noise detectors may enable spectroscopy of extrasolar planets

Project Title: Photon counting NIR LmAPD Arrays for Ultra-low Background Space Observations

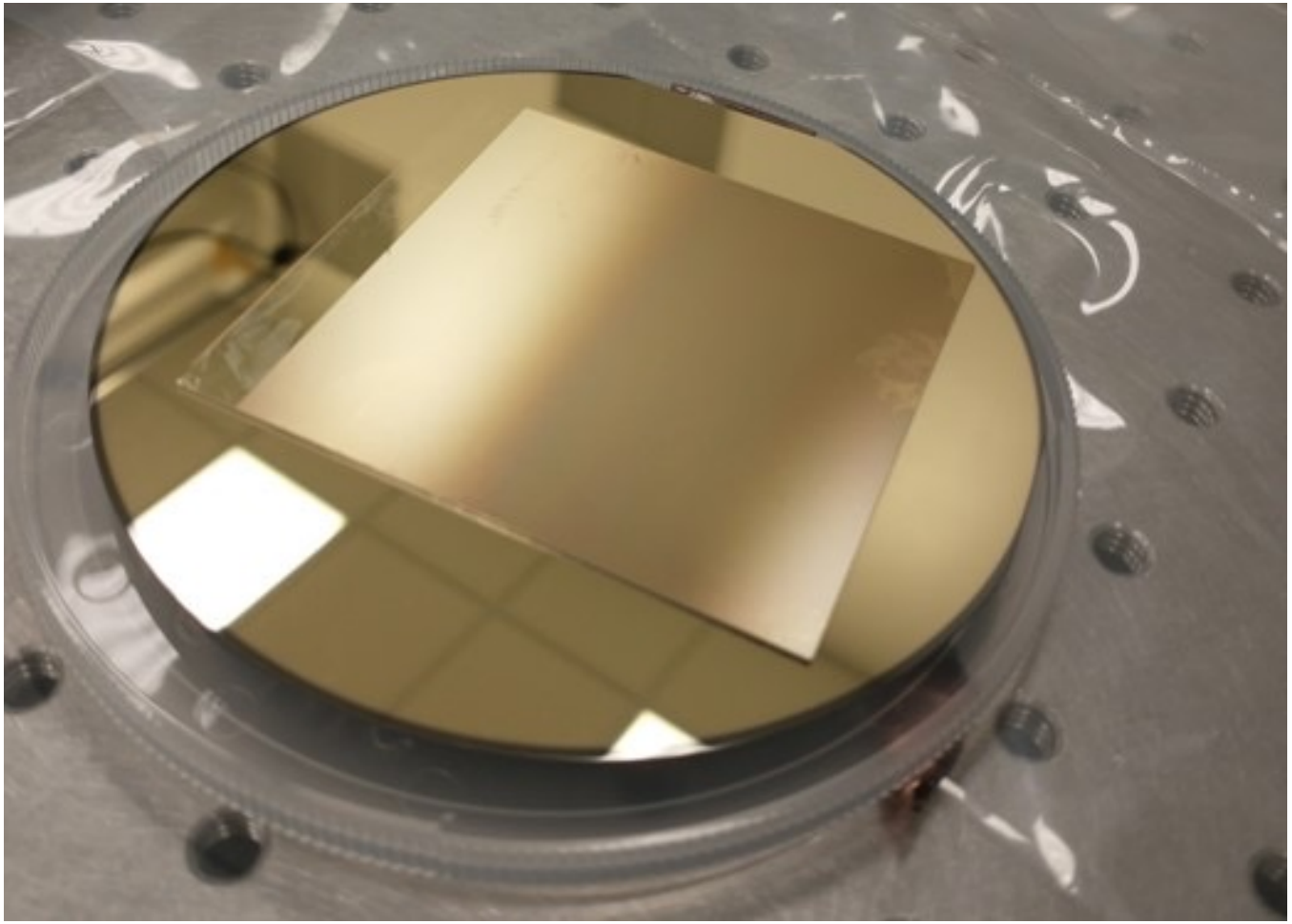
PI: Michael Bottom (U. of Hawaii)

1.2-m Al Mirror Prepared for Cryo Testing

Significance: This technology may enable required ultra-stability (~10 pm) for the next IR/Optical/UV Great Observatory

Project Title: Predictive Thermal Control (PTC) Technology to enable Thermally Stable Telescopes

PI: H. Philip Stahl (MSFC)

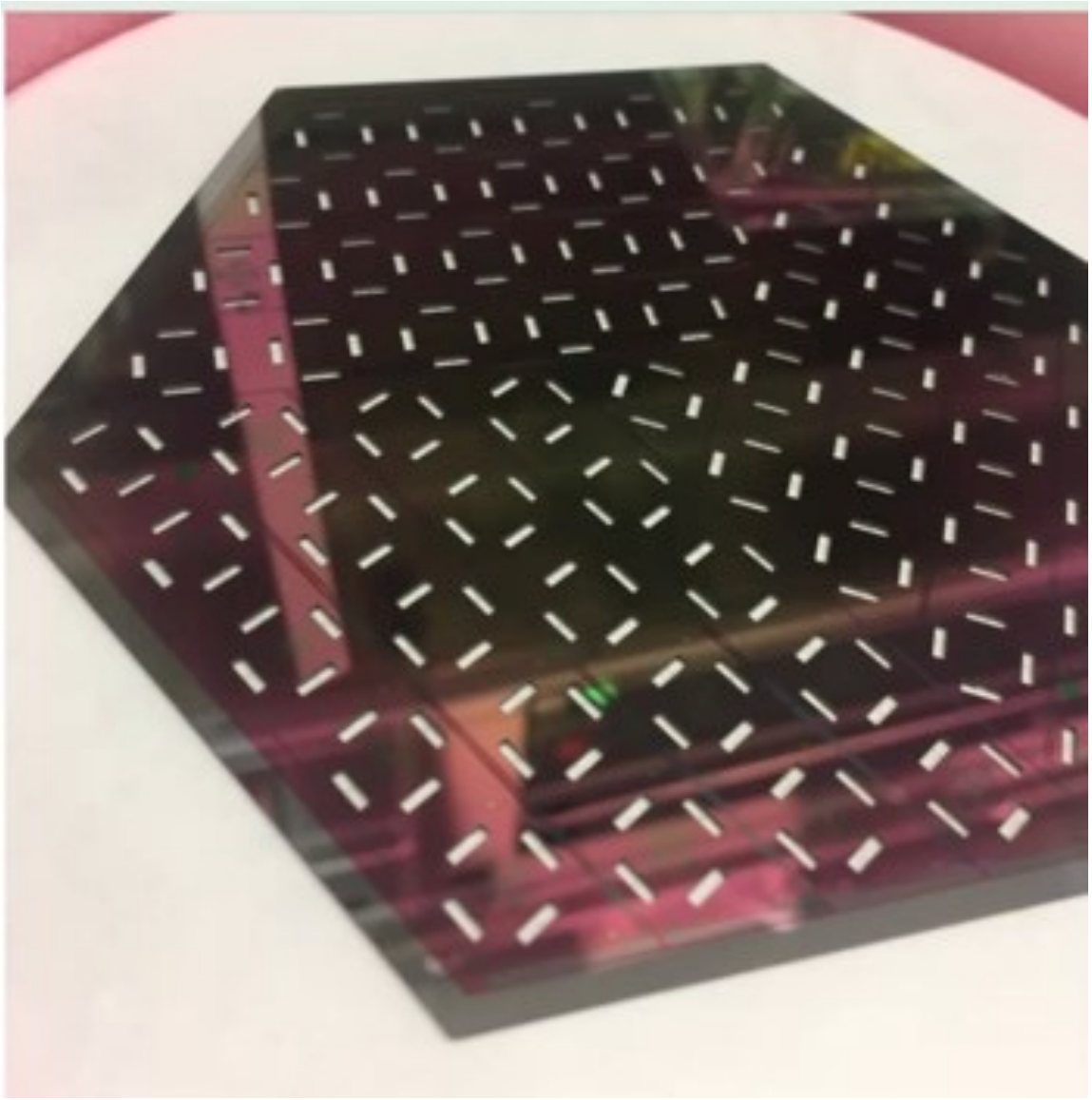


CHESS echelle grating

Significance: May enable future UV/optical spectroscopic missions; enables current UV suborbital missions

Project Title: Electron-Beam-Lithography Ruled Gratings for Future UV/Optical Missions: High Efficiency and Low Scatter in the Vacuum UV

PI: Brian Fleming (U. of Colorado)

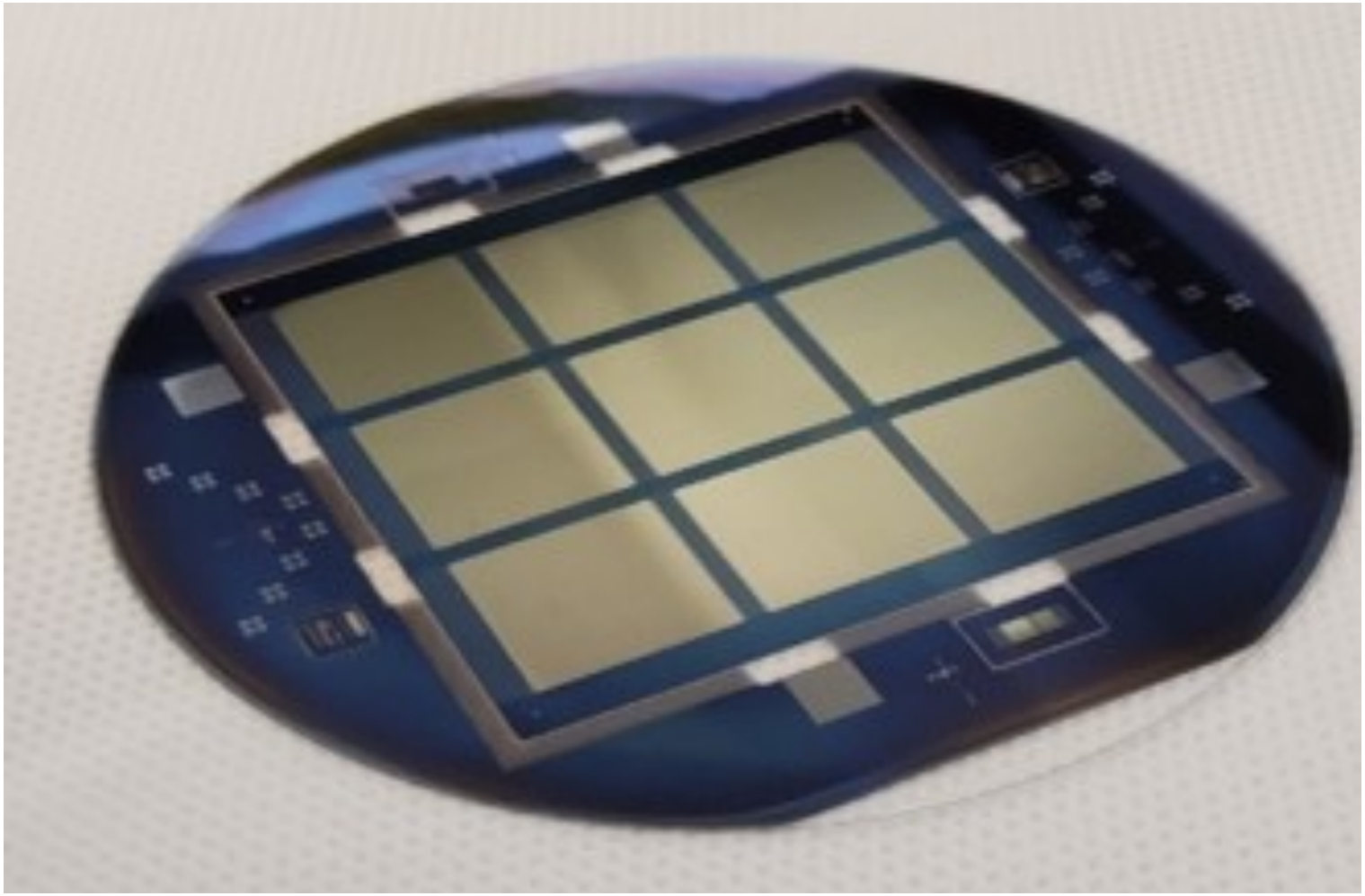


First LiteBIRD-Style MF Detectors

Significance: May enable future Cosmic Microwave Background (CMB) missions, e.g. LiteBIRD

Project Title: Technology Development for LiteBIRD and other CMB Missions

PI: Adrian T. Lee (UC Berkeley)

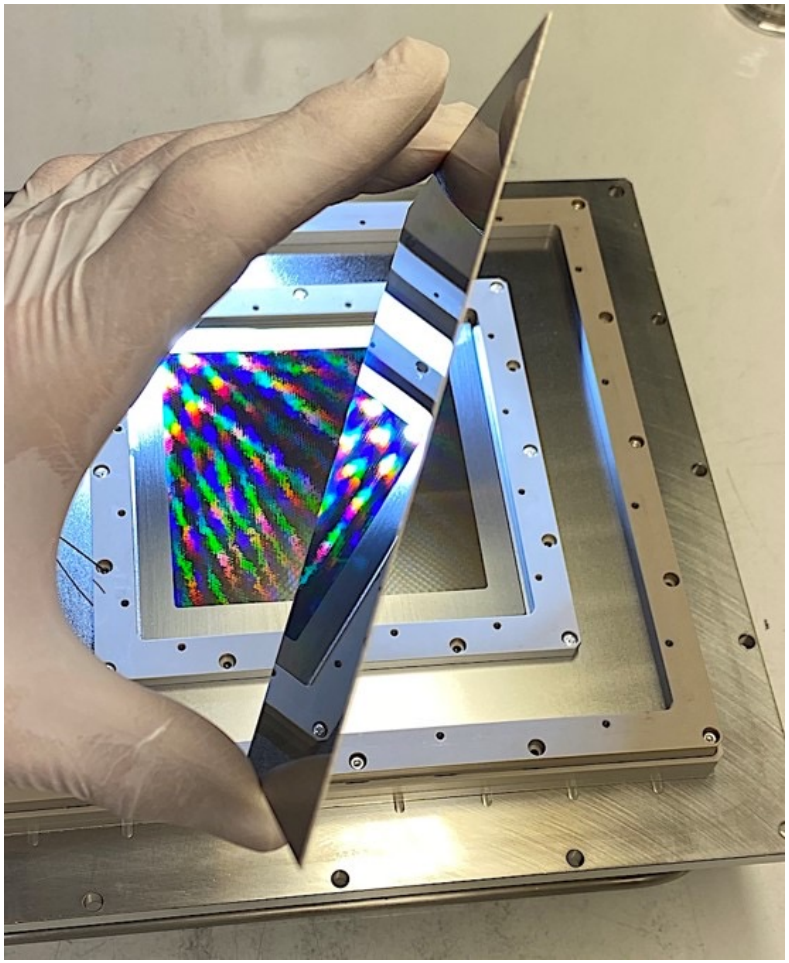


Keystone Array of Microshutters after DRIE (Dry Reactive Ion Etching)

Significance: May enable sparse-field multi-object spectroscopy for future strategic and other missions

Project Title: Scalable Microshutter Systems for UV, Visible, and IR Spectroscopy

PI: Matt Greenhouse (GSFC)

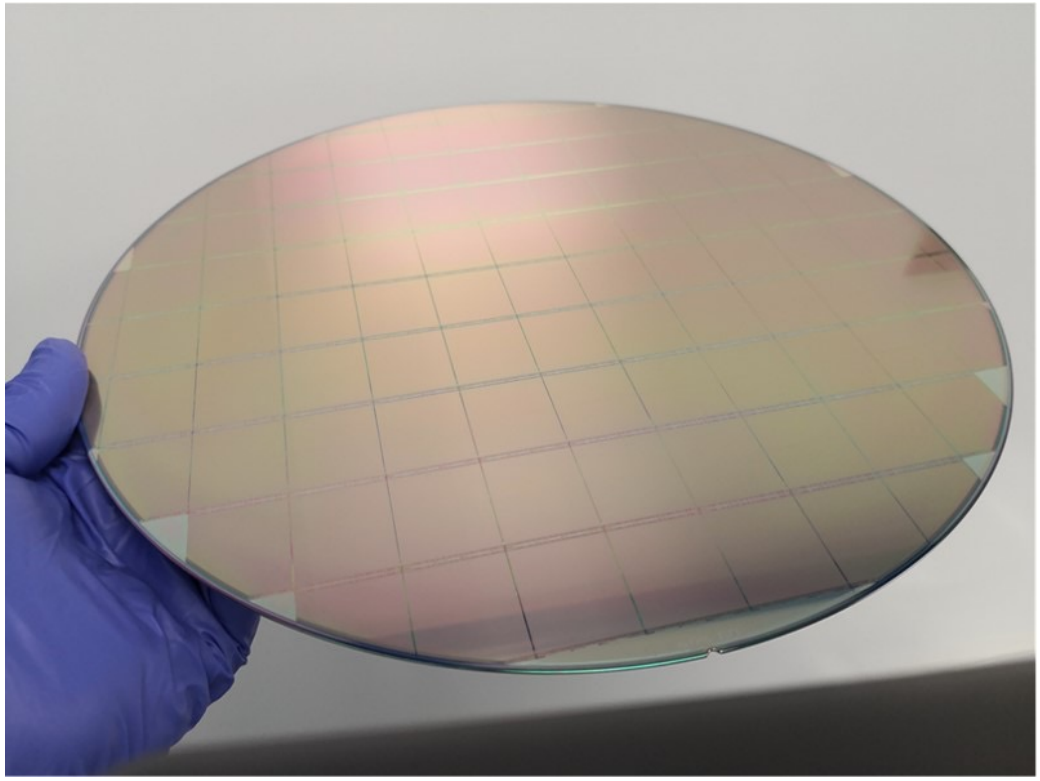


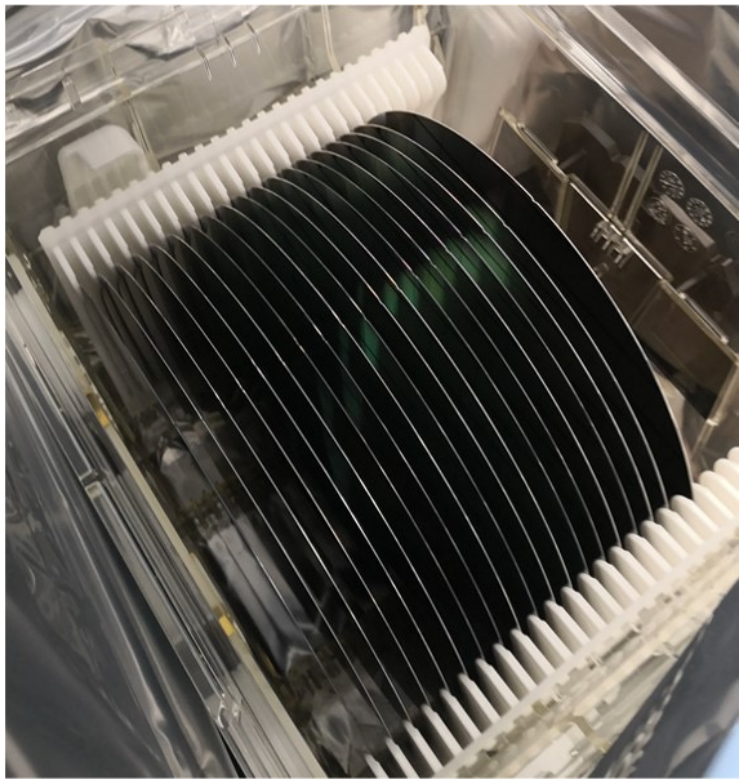
127-mm Atomic Layer Deposition (ALD) Multi-Channel Plate (MCP) Detector

Significance: Baselined by HabEx, LUVOIR, and CETUS for UV/Visible light detection

Project Title: High-Performance Sealed-Tube Cross-Strip (XS) Photon-Counting Sensors for UV-Vis Astrophysics Instruments

PI: Oswald Siegmund (UC Berkeley)



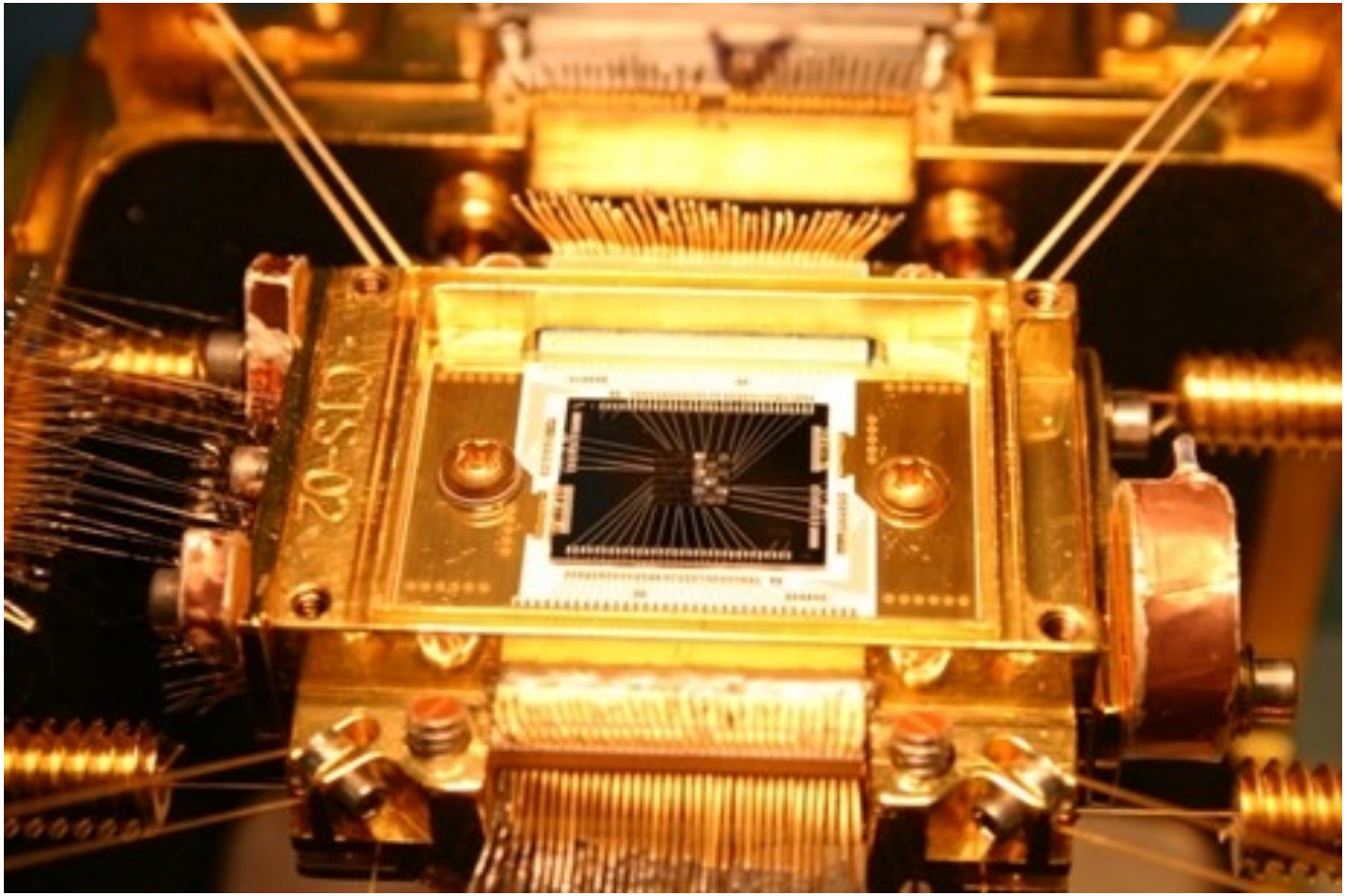


Timepix4v2 Wafers

Significance: Four-side-buttable low-power readout chips may enable future far-UV missions with large focal planes

Project Title: Large-Format, High-Dynamic-Range UV detector using MCPs and Timepix4 readouts

PI: John Vallerga (UC Berkeley)



Detector Used in Lab Astrophysics

Significance: Supports NASA X-ray observatories by developing similar instruments in ground-based labs, replicating conditions in astrophysical sources observed by spaceflight instruments, and observing them parametrically to help interpret space-based data

Project Title: Advanced X-ray Microcalorimeters: Lab Spectroscopy for Space Atomic Physics

PI: F. Scott Porter (GSFC)